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Monterey, California

SENSITIVITY OF AQAM PREDICTIONS FOR NAVAL AIR OPERATIONS TO METEOROLOGICAL AND DISPERSION MODEL PARAMETERS

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Ground level pollution concentrations have been calculated at a Naval Air Station using a modified Air Quality Assessment model. The sensitivity of model predictions to varying meteorological conditions and assumed dispersion model parameters were determined. Optimum receptor locations for model validation efforts were identified.

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INTRODUCTION

There have been numerous modeling methods developed to predict the dispersion of air pollution. In recent years there have also been several major modeling efforts directed at aircraft operations. An early model was developed by Northern Research and Engineering Corporation (NREC)[2]. This model provided the basis for the GEOMET model[3] which has been validated to some extent by measurements at the Washington National Airport[4]. Military operations (aircraft and air-base) differ significantly from civilian operations. For this reason the USAF contracted the Argonne National Laboratory to develop an air quality assessment model (AQAM) for Air Force operations[5-9]. The latter model was based upon an earlier TRW Model, the Air Quality Display Model (AQDM)[10].

Most of these aircraft related models consist of three major parts, a source inventory model which yields rates and quantities of emitted pollutants, a short term dispersion model and a long term dispersion model. Many of the techniques (and their limitations) which have been used to predict the spreading rate from elevated sources have been discussed by Mathis and Grose[1]. Most of the models are solutions to the diffusion equation assuming Gaussian dispersion in both the horizontal and vertical directions[1,11]. In these cases the plume dimensions are specified by vertical and horizontal standard deviations (σ_y, σ_z) which in turn are functions of the atmospheric stability and the downwind distance or travel time. The models predict average steady state conentrations over some time interval; typically ten minutes or one hour for the short term models. Special provisions are made to account for very low wind speeds and the presence of elevated stable layers (lid height). Plume rise due to thermal buoyancy and vertical momentum and downwash effects are sometimes used to obtain "effective" emission heights. Most models neglect gravitational settling and chemical reactions within the atmosphere although a few consider the latter effect through a specified half-life. Short term models assume an average wind speed and direction and atmospheric stability class over the dispersion time considered.

Aircraft operations are specified through a landing and take-off operational cycle time-in-mode (LTO). The cycle is defined by the number and type of operational modes required to complete the cylce. The EPA utilizes ten, and the USAF eleven, operational modes to define an LTO cycle[12].

Accuracy of model predictions depends both upon the assumptions employed in the dispersion model and upon the detail and accuracy of the specified emission rates for aircraft, air-base and off air-base (environs) operations. Long-term models appear to agree reasonably well with observations[14]. However, none of the short term models for aircraft operations have been validated as quantitatively accurate and it is doubtful that they will ever give a good comparison of concentrations on an hour-by-hour basis[11,13,14]. The values of σ_y and σ_z are not known accurately (especially in the near-source region)[11,14], sources are not continuous, and atmospheric conditions are not steady. However, the models have been shown to be good qualitative tools for assessing the effects of changes in operating procedures and meteorology on atmospheric pollution levels[14]. In addition the short term models appear to predict frequency distributions which are in reasonable agreement with observations[14].

Regardless of the accuracy of the model for modeling the airbase operations, modeling of the surrounding environment is very difficult. It is this background level of pollution (which is typically much greater than the aircraft/air-base generated pollution) that has made it impossible to date to adequately validate any of the short term models. In addition, the cost is high in equipment and manpower to operate adequate sampling stations. A large data base is needed which includes a wide range in meteorological and operational conditions. Nevertheless, validation of the models needs to be done in as complete and well planned manner as is affordable. This is required if the models are to be used with confidence in assessing the effects of aircraft/air-base operations on both the airbase and the surrounding community.

The validation process can concentrate on high or low intensity sampling (instantaneous vs. continuous) or both in some combination. It can be done for "on-base" effects or airbase effects on the local environment. It can consider only ground level concentrations or may include some elevated receptors. Validation can also be done for some of the sub-models within the overall dispersion model. Some of these sub-models are based upon questionable assumptions. For example, what are appropriate values for σ_y , σ_z and plume rise for the aircraft jet exhaust during take-off?

Before validation work is conducted it is necessary to determine the sensitivity of the model predictions to its input parameters (meteorology and operations). The sensitivity results indicate under what conditions the model can be best validated if only limited sampling can be accomplished. In addition, the model can be used to help locate the optimum receptor locations for model validation. The sensitivity of the model (or sub-model) to the input parameters needs to be assessed at a particular receptor location with all sources (aircraft, air-base and environ) present because of the interactions that occur between various sources (i.e. variations in "combined" concentrations of multiple sources at one receptor).

Previous model validation and sensitivity studies[14] (with only point and area sources) have shown that (a) predicted concentrations are very sensitive to the specified stability class and vary more with wind direction than observed, (b) the values of σ_z employed strongly affect the model predictions for high lid heights (2500 m), (c) the models are weak or inapplicable for low wind speeds (< 1.5 m/sec), and (d) the predicted concentrations are strongly dependent upon the lid height under unstable atmosphere conditions.

This investigation was conducted to determine the sensitivity of an air quality assessment model (AQAM) for Naval air operations[15,16] to specified input for meteorological and operational conditions. The sensitivity study was conducted for operations at NAS, Miramar, California to precede a model validation effort at that facility which is scheduled to begin during the summer of 1978.

AQAM FOR NAVAL AIR OPERATIONS

The Source Inventory and Short Term Dispersion Computer Codes of the AQAM model for Air Force operations[5-9] were modified for application to Naval Air Operations[15,16]. Details of the modifications are presented in references 15 and 16.

The EPA utilizes ten, and the USAF eleven, operational modes to define a LTO cycle. Take-off and landings in these LTO's were restricted to a vertical plane and did not define operational modes which are peculiar to the USN; such as hot refueling, field carrier landing practice (FCLP), Navy touch-and-go (TGO) and approaches made under visual flight rules (VFR). In addition, take-off delays and operations peculiar to rotary wing operations (hover work, pad work, autorotations) were not included in these original models. These operations were incorporated into the AQAM model and resulted in an LTO cycle with 21 operational modes as shown in Table I.

Table II presents the additions made to the input routines of the original AQAM program. The additions are grouped by the data sets specified in AFWL-TR-74-54[6].

Many of the operations added to the LTO occur at heights greater than 500 feet above ground level (AGL). These may not affect ground level pollutant concentrations near the airbase but contribute to total emissions and to pollutant concentrations at elevated heights.

A plot routine was also incorporated into AQAM so that predicted pollutant distribution patterns could be more readily observed.

MODEL SENSITIVITY STUDY

In order to determine the sensitivity of the model predictions to the input meteorological and operational conditions and to certain model parameters (σ_y , σ_z , etc.) many parameters were independently varied. The imposed variations were not intended to be simulations of actual conditions, since in most cases the variation of one meteorological condition (i.e. wind speed) affects another (i.e. stability level). The independent variations do provide valuable data for model validation.

The sources included in the model for NAS Miramar are presented in Table III. A map showing representative grid locations is shown in Figure 1. The receptor grid employed had a one kilometer spacing.

The nominal conditions and variations employed in the sensitivity study are presented in Table IV. Specific cases which were run are presented in Table V.

RESULTS AND DISCUSSION

General Discussion

The sensitivity of the multiple source model predictions to the parameters presented in Tables IV and V should in general follow the Gaussian behavior for individual point and line sources. However, the behavior at a particular receptor will depend to a large extent on its location relative to the various (and numerous) sources throughout the receptor grid. From a model validation standpoint it is important that hourly average type data be collected at locations where the air-base/aircraft contributions are large compared to all environ (background) concentrations. "Optimum" receptor grids for model validation should be found which have both large air-base/aircraft contributed pollution concentrations and concentrations which are sensitive to meteorological and operational conditions. In addition, at least one (and preferably more) receptor should be located upwind of the airbase to determine background levels of pollution.

In addition to the hourly average data based on continuous sampling, the Air Force validation effort at Williams AFB has pointed out the necessity for characterizing individual sources with short sampling time, non-continuous data.

For point sources, the Gaussian dispersion formula for ground level $(z = 0)$ concentrations has been presented by Turner[11].

$$\chi(x,y,\ z=0;\ H) = \frac{Q}{\pi\sigma_y\sigma_z\bar{U}} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] \exp\left[-\frac{1}{2}\left(\frac{H}{\sigma_z}\right)^2\right] \qquad (1)$$

where:

χ = concentration, g/m^3

Q = uniform emission rate, g/sec

σ_y, σ_z = standard deviations of plume concentration in the horizontal and vertical directions respectively, m

$\bar{U}$ = mean wind speed, m/sec

H = initial plume height, m

For concentrations along the plume centerline (y = 0) the first exponential term vanishes and for ground level sources with no plume rise (H = 0) the second exponential vanishes.

When vertical diffusion is limited by a stable layer at height h_{lid} the diffusion equation must be modified. Turner[11] suggests that when the downwind distance is twice that required for σ_z to become equal to 0.47 h_{lid}, then the plume can be considered as uniformly distributed in the vertical direction. Then (1) becomes

$$\chi(x,y,z;H) = \frac{Q}{\sqrt{2\pi}\,\sigma_y\, h_{lid}\, \bar{U}} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] \qquad (2)$$

For (infinite) line sources Turner has presented:

$$\chi(x,y,z=0;H) = \frac{2q}{\sin\phi\,\sqrt{2\pi}\,\sigma_z\,\bar{U}} \exp\left[-\frac{1}{2}\left(\frac{H}{\sigma_z}\right)^2\right] \qquad (3)$$

where:

q = source strength per unit distance, g/sec-m

ϕ = angle between line source and wind direction, $45° < \phi < 90°$

Behavior of the short-term model predictions under varying meteorological conditions should in general follow equations (1), (2), or (3) depending upon the receptor location relative to the dominant emission source. At receptors where multiple sources contribute significantly the behavioral trends will not be so readily estimated a priori.

The effects of individual variations in meteorological and dispersion model parameters are discussed below in order to examine the sensitivity of the model predictions. It is not implied that these parameters can be varied independently in actual practice.

Results of the parametric study are presented in Tables VI through XVII and are listed below:

Results presented	Table Number
Maximum receptor locations and concentrations	VI
Effects of h_{lid}	VII
Effects of stability class	VIII
Effects of wind speed	IX
Effects of wind direction	X
Effects of ambient temperature	XI
Effects of specified initial line source width for aircraft taxi and runways	XII
Effects of specified emission heights for aircraft taxi and runways	XIII
Effects of specified initial vertical dispersion parameter	
(a) all point sources	XIV
(b) all area sources	XV
(c) all line sources	XVI
Special receptor concentrations	XVII

Receptor Locations for Model Validation

Environ sources were predicted to peak south of the airbase at receptors (11,2), (11,3), and (11,4). (11,2) is near the center of Montgomery Field and (11,4) lies due north at the intersection with Interstate 15.

For a dominant wind from the WNW (292°), nominal background (to the air-base) pollutions levels (at $x = 8.37$, $y = 8.52$) were 140 $\mu g/m^3$ and 6 $\mu g/m^3$ of CO and PT respectively (special receptor #1, Table XVII). Maximum background levels reached 582 and 23 $\mu g/m^3$ for CO and PT respectively for stable conditions (stability class = JSTAB = 5). More stable conditions (increasing JSTAB) decrease σ_y and σ_z and increase concentration levels (equation (1)). Lowering h_{lid} increased concentrations (equation (2)) while increased wind speeds reduced concentrations (equation (1)) as expected.

These background levels are high (except for particulates) compared to the nominal grid receptors employed and imply that model validation would be difficult except near strong aircraft and/or air-base sources. Table XVII presents data at two such special receptors (#8 and #11). Special receptor #8 is located 0.34 km downwind (for a WNW wind) from the hot refueling area and special receptor #11 is located 0.08 km downwind of the take-off end of runway # 1. At these two locations aircraft sources dominate all others, indicating that they would be adequate locations for measurements to validate the model. However, receptor #11 may be too close to the emission source.

Maximum Receptor Concentrations

All of the following discussion (except as noted) assumes a dominant wind from the WNW (292°). As discussed above, maximum contributions from environ sources occurred south of the airbase (at receptors (11,2), (11,3), and (11,4)). In general, the contribution from air-base sources was negligible. At receptors where air-base sources were the major contributor (downwind of test cells) overall concentration levels were quite low. However, no attempt was made to locate special receptors downwind of the test cells where concentrations may have been significant during cell operation.

Except for the special receptors discussed above, maximum concentrations from aircraft sources normally occurred for CO , HC and PT at receptor (11,8), near the intersection of runway #1 and the emergency runway (#5). NO_x generally peaked further downwind. Stable conditions (JSTAB = 3,4) and low lid height (h_{lid} = 200m) shifted the peak concentrations downwind whereas a shift in wind direction of 20° (WD = 272°) moved the peak concentrations upwind. Larger assumed values for aircraft initial line source width also moved the peak concentrations upwind.

Fig. 2 presents typical variations in the aircraft contribution to concentrations for CO and PT in both the wind and cross-wind directions. Figures 3 and 4 present typical concentration profiles for CO and PT from aircraft sources.

Effect of Meteorological Parameters

Lid Height

The effect of variations in h_{lid} are presented in Table VII for stability classes of 1, 4, and 5. Table XVII presents data for three of the special receptors.

In general, environ and aircraft sources behaved in the same manner. Air-base contributions were small and varied more rapidly and less predictably. Stability class did not greatly effect the variation of concentration with h_{lid} , although it greatly affected magnitude. At near source locations (maximum receptor concentrations) variation in h_{lid} had negligible effect on concentrations except for very unstable conditions (JSTAB = 1). For

JSTAB = 1 , concentrations decreased less than linearly with increasing, but small values of h_{lid} (100 - 400m). For large h_{lid} (800 - 1400 m) peak concentrations did not vary with h_{lid}. This behavior is to be expected from equations (1) (large h_{lid}) and (2) (low h_{lid}). Also as expected, away from peak values, concentration decreased approximately linearly with increasing but small values of h_{lid} and varied little for large values of h_{lid} . As h_{lid} was increased from 200 to 400 m conditions, peak receptor locations moved upwind.

Stability Class

Stability class had the single largest effect on the predicted concentrations. As stability increases (JSTAB = 1 → 5) , σ_y and σ_z drop and ground level concentrations generaly increase (equation (1)). Tables VIII and XVII indicate that concentrations can increase by factors of 3 to 5 for JSTAB increases from 1 to 5. At special receptors increases by as much as a factor of 10 were predicted. For large h_{lid} the effect is more pronounced than for low h_{lid} .

Again, aircraft and environ sources behaved similary but air-base sources varied unpredictably with increasing stability.

Wind Speed

Increasing wind speed (Tables IX and XVII) decreased concentrations of all sources approximately linearly as expected from equation (1), (2) and (3). More rapid variations occurred when receptors were very close to a strong source (special receptor #11, Table XVII).

Wind Direction

Wind direction (Tables X and XVII) had negligible effect on concentrations from environ sources. As the wind direction was changed from 292° to 272° the wind became nearly parallel to the primary taxi and runway line sources. Peak concentrations from aircraft sources dropped by as much as 20% and downwind receptor concentrations increased by as much as a factor of 3.5.

Ambient Temperature

An ambient temperature change of 10°F (Table XI) as an independent parameter had no effect on predicted concentrations.

Dispersion Model Parameters

Initial Aircraft Line Source Width (Table XII)

This parameter had negligible effect on concentrations from aircraft sources for nominal lid height (800 m) and stability class (1). Effects at special receptors and for other meteorological conditions were not determined.

Aircraft Line Source Emission Height (Table XIII)

This parameter had negligible effect for nominal meteorological conditions except at special receptor #8 (downwind of hot refueling). At this receptor, increasing the aircraft emission height from 4 m to 16 m reduced the predicted concentrations by approximately a factor of 3. Plume rise of jet exhausts (which are neglected in the model) may have a dominant affect on model validation at particular receptors.

Initial Vertical Dispersion Parameters (Tables XIV, XV, XVI, XVII)

Increasing (separately) the initial vertical dispersion parameters for point, area, and line sources by a factor of 1.5 had negligible effect on predicted concentration except at near source special receptors. Even at the latter locations predicted variations were less than 20%.

Aircraft Line Sources Above 150 m Altitude

Eliminating all aircraft line sources above 150 m altitude had insignificant effects upon predicted ground level concentrations for nominal meteorological conditions. For very low lid heights significant effects may occur, but were not investigated. The aircraft sources above 150 m do contribute significantly to the total yearly pollutants emitted by aircraft at NAS, Miramar.

CONCLUSIONS AND RECOMMENDATIONS

Ground level pollution concentrations at NAS, Miramar have been predicted using the modified AQAM model for various meteorological conditions and model parameters. Special receptors locations have been identified which appear to be ideally suited for model validation efforts.

Air-base contributions to the predicted concentrations were very small. Background (environ) source levels for all but particulates are high and will make model validation difficult except at special receptors where aircraft sources dominate (for example, downwind of hot refueling and the take-off end of runway #1). Aircraft particulate sources dominate all other particulate sources throughout the receptor grid.

Plume rise of aircraft jet exhausts during taxi, idle and take-off may significantly affect measured ground level concentrations. Model changes may be required to incorporate this effect.

The NAS, Miramar data incorporated into the modified AQAM model were for the year 1975 and may require updating before comparison with measured data is performed.

Table I. Navy LTO modes

MODE OF OPERATION	SOURCE MODEL
Startup	Area
Taxi out	Line
Take off delay[a]	Area
Engine check	Area
Runway (take off) roll	Line
Climb (1+2)	Line
Approach IFR	Line
Approach VFR[a]	Line
Landing	Line
Taxi in	Line
(Hot + Pit) refuel delay[a]	Area
Hot refuel[a]	Area
Shutdown	Area
(Arrival + Departure) servicing	Area
Fuel venting	Area
Fill + spill	Area
TGO pattern[a]	Line
FCLP pattern[a]	Line
Pad work[a]	Line
Hover work[a]	Area
Autorotation pattern[a]	Line

[a]Modification to AQAM

TABLE II Additions to Input for AQAM

A. Data Set 1

F14 - Runway roll eqn = eqn #38

B. Data Set 1a

Parameter	Units	Description[15,16]
LASCNT(50)	degrees	Light Climb Angle
PITDLY(50)	minutes	Delay time to enter pit (zero if hot refuel)
HRDLTM(50)	minutes	Hot refuel delay time (keyed to IHRFLG)
HRTIME(50)	minutes	Hot refuel time for any A/C that ever hot refuels, irrespective of whether it actually hot refuels or not (keyed to IHRFLG)
IHRFLG(50)	-	Hot refuel flag - 1 - hot refuel - 0 - no hot refuel (Truck emissions keyed to IHRFLG)
IHPIT(50)	-	Fuel in Pit Flag - 0 - no (i.e. all A/C that hot refuel) - 1 - yes
TOIDL(50)	minutes/engine	Take-off delay time at end of runway
ENTHT(50)	km	Entry height for VFR arrival (normally 0.9144 for jet A/C)
EMXSPD(50)	km/hr	Maximum speed entering break
BRKHT(50)	km	Break Altitude
AUTANG(50)	degrees	Autorotation approach 2 angle
CWD(50)	km	Crosswind distance (Jet A/C normally 3.0) (Helos normally 1.6092)
CLHT(50)	km	Climb height for TGO's at crosswind turn entry (.152 for jet A/C) (.046 for Helos)
PTNHT(50)	km	Height of downwind leg for TGO's

PTSPD(50)	km/hr	A/C speed in FCLP & TGO patterns for take-off & crosswind
PDHVTM(50, 6) (A/C, N)	minutes	Time in hover for A/C I on pad associated with runway N

Data Set 5A

Variable	Columns	Definition
NRFALT	20-24	No. of refueling areas + Refueling delay areas (max. of 4)
NPAD	24-28	No. of off runway operating areas for V/STOL (helos) pad and hover work (max. of 6)

Data Set 5B

ANNARR	9-16	IFR + VFR
ANNVFR	33-40	Annual VFR approaches for IACTYP
ANNFCL	41-48	Annual FCLPS for IACTYP
ANNPAD	49-56	Annual approaches to pads by A/C type (helos, zero for fixed wing)
ANNAUTO	57-64	Annual autorotations by A/C type (helos, zero for fixed wing)

Data Set 5.C.1.A

ALTRFA(I,J)
(Format 3F8.2)

Refuel & refuel delay areas
(Input the delay area, followed by the associated refuel area)
I = 1, NRFALT
J = 1, 2, 3
1 X of center of area, km
2 Y of center of area, km
3 length of side of square, meters

must be in following order:

one data card each:
- hot refuel delay area
- hot refuel area
- pit refuel delay area
- pit refuel area

X: columns 1-8
Y: columns 9-16
length: 17-24

Data Set 5.C.1.B. (off runway areas for pad & hover work)

PDAREA(I,J)

I = 1, NPAD
J = 1, 3
1 = X , km
2 = Y , km
3 = length of side, km

Table 16

Aircraft	Computer Name	ID Number
RF-8G	F-8G	38
F-8H, J	F-8J	39
F-14A	F-14	40
A-3	A-3	41
A-4C, D, E, F	A-4	42
RA-5	A-5	43
A-6A, B, E	A-6	44
H53	H53	45
H3A, G, D, H	H3	46
H2D, F	H2	47
H46D, F, A	H46	48
H1	H1	49
Transient	-	50

Data Set 5.D.1.A (Format 6F8.3)

Variable	Column	Units	Definition
DOUT	1-8	km	Distance from airport tower where VFR break entry reaches 3000 ft. AGL for jet A/C (or same distance for helos regardless of height)
PTNFLG(N)	9-16	-	Pattern direction 0.0 for left-hand pattern 1.0 for right-hand pattern
TDNPT(N)	17-24	km	Distance from approach end of runway that FCLP touchdown occurs

Data Set All use (8F8.0)

		Column	Definition
5.D.3.1.A.	RNVFAR(I,N)	1-8,9-16,etc.	Annual VFR arrivals of A/C I or Runway N
5.D.3.1.B.	RNTGAR(I,N)	1-8,9-16,etc.	Annual TGO's
5.D.3.1.C.	RNFCAR(I,N)	"	Annual FCLP's

		Column	Definition
5.D.3.1.D.	RNPDAR(I,N)	1-8,9-16,etc.	Annual pad approaches of A/C I to pad associated with runway N
5.D.3.1.E.	RNATAR(I,N)	"	Annual autorotations

Table 17

	Engine ID#
J79-G10	13
J57-P16	14
J57-P420	15
TF3-P412	16
J52-P8	17
T58-6-8F	18
T58-6-10	19
T53-L-13	20

TABLE III

Summary of Sources at NAS Miramar

I. Air-Base Sources

15 Point Sources

1 training fire
5 test cells
2 run-up stands
1 power plant
6 storage tanks

30 Area Sources

evaporative breathing
space heating
off-road vehicles
civilian vehicles

22 Line Sources

civilian vehicles

II. Aircraft Sources

0 Point Sources

18 Area Sources

6 parking
4 refueling
1 take-off delay
7 pads and hover

173 Lines

LTO modes

III. Environ Sources

1 Point Source

off-base test cell

18 Area Sources

land-use

9 Lines

roadways

TABLE IV

Model Parameters

	Nominal	Variations
Wind Speed (m/s)	2.57	3.6, 9.27
Wind Direction (cw from north)	292	272, 287
Temperature (^oF)	60	70
Turner Stability class	1	2,3,4,5
Lid Height (m)	800	100,200,400,1400
Initial Line Source Width for A/C Taxi and Runway (m)	20	15,30
Initial Vertical Dispersion parameter for A/C taxi and runway (m)	8	12
Average Emission Height for A/C taxi and runway Lines (m)	4	8,16
Initial Vertical Dispersion parameter for all point sources	-	x 1.5
Initial Vertical Dispersion parameter for all area sources	-	x 1.5
Initial Vertical Dispersion parameter for all line sources	-	x 1.5

Computer Runs for Sensitivity Study*

Run No.	Meteorology					Aircraft Taxi and Runway Lines			Initial Vertical Dispersion Parameter (m)		
	Wind Speed (m/s)	Wind Direction	Temperature (°F)	Turner Stability Class	Lid Height (m)	Initial Line Source Width (m)	Initial Vertical Dispersion Parameter (m)	Average Emission Height (m)	All Points	All Areas	All Lines
2/16/19/20	2.57	292	60	1	800	20	8	4	-	-	-
3	9.27										
4	9.27			4	1400						
5				4	400						
6				4	200						
7				4	100						
8					400						
9				4							
10			70								
11						15					
12						30					
13								8			
14/15							12	8			
17/21								16			
18/24		287									
22				3							
23	3.6			2							
25					200						
26					1400						
27		272									
28				5	200						
29				5	1400						
30				5							
31									x 1.5		
32				5					x 1.5		
33					200				x 1.5		
34										x 1.5	
35				5						x 1.5	
36					200					x 1.5	
37											x 1.5
38				5							x 1.5
39					200						x 1.5
40									all lines above 150 m eliminated		

*Only variations from the nominal conditions of Run #2 are indicated

TABLE VI

MAXIMUM RECEPTOR CONCENTRATIONS

Grid Location
Concentration, $\mu gm/m^3$
Fraction of Total

Run #	AIRCRAFT				AIR-BASE				ENVIRON				TOTAL			
	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT
2	11,8 154 .75	11,8 59 .87	12,8 20 .84	11,8 81 .98	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,3 24 .98	11,4 404	11,2 110	11,4 34	11,8 83
3	11,8 35 .71	11,8 11.5 .82	12,8 5.7 .84	11,8 19 .98	13,9 2.2 .11	12,9 1.1 .18	13,9 1.4 .52	13,9 2.0 .69	11,4 118 1.0	11,2 32 1.0	11,4 9.8 .98	11,2 7.4 1.0	11,4 118	11,2 32	11,4 10	11,8 19.8
4	13,8 370 .82	13,8 135 .88	13,8 39 .86	13,8 207 .99	15,8 26 .24	15,8 3.7 .19	15,8 17 .70	15,8 23 .70	11,4 445 1.0	11,2 123 1.0	11,3 36 1.0	11,2 27 1.0	13,8 453	13,8 153	13,8 45	13,8 210
5	13,8 839 .84	13,8 306 .90	12,8 95 .88	13,8 475 .99	15,8 17.5 .10	12,9 9.8 .16	15,8 12 .41	15,8 16 .36	11,4 1145 1.0	11,2 320 1.0	11,4 94 .99	11,2 72 1.0	11,4 1146	13,8 340	12,8 108	13,8 480
6	13,8 838 .78	13,8 306 .87	12,8 95 .84	13,8 474 .98	13,9 10 .04	12,9 9.8 .15	13,9 5.7 .23	13,9 10 .54	11,4 1229 1.0	11,2 332 1.0	11,4 100 .99	11,2 73 1.0	11,4 1229	13,8 350	12,8 112	13,8 483
7	13,8 889 .65	13,8 327 .79	12,8 96 .73	13,8 501 .97	15,8 15.4 .03	12,9 9.9 .09	15,8 9.2 .17	15,8 13.6 .19	11,4 1439 1.0	11,2 382 1.0	11,3 116 1.0	11,2 80 1.0	11,4 1439	13,8 413	12,8 130	13,8 518
8	11,8 164 .63	11,8 62 .79	11,8 18 .70	11,8 87 .97	13,9 4.9 .04	12,9 3.8 .12	13,9 3.1 .25	13,9 4.4 .38	11,4 472 1.0	11,2 129 1.0	11,4 38 .96	11,2 28 1.0	11,4 473	11,2 129	11,4 40	11,8 90
9	13,8 839 .84	13,8 306 .90	12,8 95 .88	13,8 475 .99	15,8 17.5 0.1	12,9 9.8 .16	15,8 12 .41	15,8 16 .36	11,4 1146 1.0	11,2 319 1.0	11,4 94 .99	11,2 72 1.0	11,4 1146	13,8 340	12,8 108	13,8 480

TABLE VI, CONT'D

Run #	AIRCRAFT				AIR-BASE				ENVIRON				TOTAL			
	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT
10	11,8 158 .75	11,8 59 .87	12,8 21 .84	11,8 83 .98	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0	11,4 404	11,2 110	11,4 34	11,8 84
11	11,8 155 .75	12,8 59 .87	12,8 20 .84	11,8 81 .98	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0				
12	10,8 203 .80	10,8 84 .91	12,8 20 .84	11,8 81 .98	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0				
13	11,8 149 .74	11,8 57 .86	12,8 20 .83	11,8 78 .99	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0				
14/15	11.8 144 .74	11,8 55 .86	12,8 19 .83	11,8 76 .99												
17/21	11,8 137 .73	11,8 54 .86	12,8 19 .82	11,8 71 .98												
18/24	11,8 151 .73	11,8 56 .85	12,8 20 .84	10,8 101 .99	13,9 3.9 .06	12,9 3.8 .17	13,9 2.5 .34	13,9 3.6 .41	11,4 402 1.0	11,2 109 1.0	11,4 33 .98	11,2 25 1.0	11,4 402	11,2 109	11,4 34	10,8 102
22	13,8 500 .84	13,8 182 .90	12,8 71 .90	13,8 286 .99	13,9 14 .11	12,9 8.5 .19	13,9 8.8 .49	13,9 14 .72	11,4 947 1.0	11,2 265 1.0	11,4 78 .99	11,2 61 1.0				
25	13,8 225 .51	13,8 82 .68	12,8 30 .66	13,8 132 .94	13,9 7.9 .03	12,9 4.5 .09	13,9 4.8 .20	13,9 7.0 .33	11,4 629 1.0	11,2 172 1.0	11,3 52 .99	11,2 36 .99				
26	11,8 149 .82	11,8 58 .91	12,8 20 .90	11,8 78 .99	13,9 3.1 .08	12,9 3.8 .22	13,9 2.0 .42	13,9 2.9 .55	11,4 376 1.0	11,2 103 1.0	11,4 31 .98	11,2 24 1.0				

TABLE VI, CONT'D

Run #	AIRCRAFT				AIR-BASE				ENVIRON				TOTAL			
	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT
27	10,8 474 .91	10,8 200 .96	10,8 26 .88	10,8 255 1.0	13.9 3.9 .04	12,9 2.9 .10	13,9 2.6 .28	13,9 3.7 .19	11,4 403 1.0	11,2 105 1.0	11,4 33 .99	11,2 24 1.0				
28	13,8 1197 .82	13,8 438 .89	13,8 125 .86	13,8 672 .99	12,9 8.1 .02	12,9 12 .14	14,8 4.9 .11	15,8 7.2 .18	11,4 1492 1.0	11,2 411 1.0	11,4 121 1.0	11,2 91 1.0				
29	13,8 1197 .82	13,8 438 .89	13,8 125 .86	13,8 673 .99	15,8 29 .10	12,9 12 .14	15,8 19 .45	15,8 27 .45	11,4 1473 1.0	11,2 409 1.0	11,4 120 1.0	11,2 91 1.0				
30	13,8 1197 .82	13,8 438 .89	13,8 125 .86	13,8 673 .99	15,8 29 .10	12,9 12 .14	15,8 19 .45	15,8 27 .45	11,4 1473 1.0	11,2 409 1.0	11,4 120 1.0	11,2 91 1.0				
31	11,8 154 .75	11,8 59 .86	12,8 20 .84	11,8 81 .98	13,9 3.1 .05	12,9 3.9 .18	13,9 2.0 .30	13,9 2.9 .44	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0				
32	13,8 1197 .82	13,8 438 .89	13,8 125 .86	13,8 673 .99	15,8 29 .10	12,9 12 .14	15,8 19 .45	15,8 26 .45	11,4 1473 1.0	11,2 409 1.0	11,4 120 1.0	11,2 91 1.0				
33	13,8 225 .51	13,8 82 .68	12,8 30 .66	13,8 132 .94	13,9 7.9 .03	12,9 4.5 .09	13,9 4.8 .20	13,9 7.0 .33	11,4 629 1.0	11,2 172 1.0	11,3 52 .99	11,2 36 .99				
34	11,8 152 .75	11,8 58 .87	12,8 20 .84	11,8 80 .98	13,9 3.2 .05	12,9 3.4 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 354 .99	11,2 97 1.0	11,4 29 .97	11,2 22 1.0				
35	13,8 1181 .82	13,8 432 .89	13,8 124 .86	13,8 663 .99	15,8 29 .10	12,9 11 .13	15,8 19 .45	15,8 27 .45	11,4 1362 1.0	11,2 378 1.0	11,4 111 1.0	11,2 84 1.0				

TABLE VI, CONT'D

Run #	AIRCRAFT				AIR-BASE				ENVIRON				TOTAL			
	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT	CO	HC	NO_X	PT
36	13,8 225 .51	13,8 82 .68	12,8 30 .66	13,8 132 .94	13,9 7.9 .03	12,9 4.0 .08	13,9 4.8 .20	13,9 7.0 .33	11,4 577 1.0	11,2 157 1.0	11,3 48 .99	11,2 32 .99				
37	11,8 149 .74	11,8 56 .86	12,8 19 .83	11,8 79 .98	13,9 3.2 .05	12,9 3.9 .18	13,9 2.1 .30	13,9 2.9 .45	11,4 403 1.0	11,2 110 1.0	11,4 33 .97	11,2 25 1.0				
38	13,8 1193 .82	13,8 436 .89	13,8 124 .86	13,8 670 .99	15,8 29 .10	12,9 12 .14	15,8 19 .45	15,8 27 .45	11,4 1473 1.0	11,2 409 1.0	11,4 120 1.0	11,2 91 1.0				
39	13,8 225 .51	13,8 82 .68	12,8 30 .65	13,8 132 .94	13,9 7.9 .03	12,9 4.5 .09	13,9 4.8 .20	13,9 7.0 .33	11,4 629 1.0	11,2 172 1.0	11,3 52 .99	11,2 36 .99				
40	11,8 154 .75	11,8 59 .87	12,8 20 .84	11,8 81 .98												

TABLE VII

Effect of Lid Height on Concentrations of

CO/PT, $\mu g/m^3$

(A) STABILITY CLASS = 1

Run #		25	8	2/20	26
Lid HT (m)		200	400	800	1400
AIRCRAFT					
Wind Direction Grids	7,10	0/0	0/0	0/0	0/0
	9,9	0/0	0/0	0/0	0/0
	11,8	216/120	164/87	154/81	149/78
	13,7	104/64	52/32	26/17	15/9
	15,6	89/55	45/29	23/16	13/10
	17,5	71/49	36/27	18/14	10/8
	19,4	58/40	29/23	15/12	8/7
Cross-wind Direction	9,4	0/0	0/0	0/0	0/.1
	10,6	8/7	4.1/4.1	2.3/3.0	1.4/2.3
	11,8	216/120	164/87	154/81	149/78
	12,10	0/0	0/0	0/0	0/0
	13,12	0/0	0/0	0/0	0/0
Special Receptors	406	410/236	-	309/183	301/178
	408	592/292	-	574/280	573/280
	411	3568/2067	-	3496/2031	3491/2027
ENVIRON					
Wind Direction	7,6	204/3.0	123/1.8	82/1.2	66/.9
	9,5	209/3.7	115/2.2	68/1.4	49/1.1
	11,4	629/30	472/25	403/23	376/22
	13,3	475/20	256/10	147/5.4	101/3.4
	15,2	444/19	233/9.7	128/5.0	83/3.0
	17,1	394/17	197/8.0	99/4.3	56/2.4
Cross-wind Direction Grids	9,0	265/7.1	175/4.9	131/3.8	113/3.3
	10,2	479/26	332/23	263/21	235/20
	11,4	629/30	472/25	403/23	376/22
	12,6	174/4.7	91/2.6	50/1.5	32/1.1
	13,8	215/6.9	108/3.4	54/1.7	31/1.0
	14,10	277/7.6	151/4.0	88/2.2	62/1.4
AIR-BASE					
Wind Direction	9,11	0/0	0/0	0/0	0/0
	11,10	1.2/0	1.2/0	1.2/0	1.2/0
	13,9	7.9/7.0	5.0/4.4	3.2/2.9	3.1/2.9
	15,8	3.9/3.3	2.8/2.4	1.4/1.2	.8/.7
	17,7	2.6/2.1	1.7/1.4	.9/.7	.5/.4
	19,6	2.0/1.6	1.3/1.0	.6/.5	.4/.3
Cross-wind Direction Grids	11,5	0/0	0/0	0/0	0/0
	12,7	0/0	0/0	0/0	0/0
	13,9	7.9/7.0	5.0/4.4	3.2/2.9	3.1/2.9
	14,11	0/0	0/0	0/0	0/0
	15,13	0/0	0/0	0/0	0/0

TABLE VII, CONT'D

(B) STABILITY CLASS = 4

Run #		7	6	5	9
Lid HT	(m)	100	200	400	800
AIRCRAFT					
Wind	7,10	0/0	0/0	0/0	0/0
Direction	9,9	0/0	0/0	0/0	0/0
Grids	11,8	495/295	498/297	498/297	498/297
	13,7	234/151	124/81	118/78	119/78
	15,6	202/125	104/65	63/40	67/42
	17,5	182/110	94/62	48/33	47/33
	19,4	162/97	84/57	42/29	35/26
Cross-wind	9,4	0/0	0/0	0/0	0/0
Direction	10,6	.2/.1	.3/.5	.3/.7	.3/.7
	11,8	495/295	498/297	498/297	498/297
	12,10	0/0	0/0	0/0	0/0
	13,12	0/0	0/0	0/0	0/0
Special	406	-	-	-	-
Receptors	408	-	-	-	-
	411	-	-	-	-
ENVIRON					
Wind	7,6	422/6.3	283/4.2	273/4.1	276/4.1
Direction	9,5	471/8.3	297/5.6	241/4.8	242/4.8
Grids	11,4	1439/68	1229/65	1145/63	1146/63
	13,3	1097/44	654/27	555/25	543/25
	15,2	1076/44	583/23	400/16	380/16
	17,1	951/35	505/22	285/12	249/11
Cross-wind	9,0	517/14	412/12	401/12	403/12
Direction	10,2	1023/53	798/48	746/47	750/47
Grids	11,4	1439/68	1229/65	1145/63	1146/63
	12,6	315/8	171/4.8	107/3.5	106/3.5
	13,8	477/17	239/8.6	157/5.7	157/5.7
	14,10	508/13	287/7.1	230/5.5	231/5.5
AIR-BASE					
Wind	9,11	0/0	0/0	0/0	0/0
Direction	11,10	1.9/0	1.9/0	1.9/0	1.9/0
Grids	13,9	4.2/5.2	10/10	10/10	10/10
	15,8	15/14	7.5/6.8	18/16	18/16
	17,7	9.6/8.0	5.2/4.5	3.6/3.1	7.8/7.1
	19,6	6.9/5.5	3.7/3.1	2.4/2.1	4.2/3.7
Cross-wind	11,5	0/0	0/0	0/0	0/0
Direction	12,7	0/0	0/0	0/0	0/0
Grids	13,9	4.2/5.2	10/10	10/10	10/10
	14,11	0/0	0/0	0/0	0/0
	15,13	0/0	0/0	0/0	0/0

TABLE VII, CONT'D

(C) STABILITY CLASS = 5

Run #		28	30	29
Lid HT (m)		200	800	1400
AIRCRAFT				
Wind Direction Grids	7,10	0/0	0/0	0/0
	9,9	0/0	0/0	0/0
	11,8	638/383	638/383	638/383
	13,7	168/111	176/116	176/116
	15,6	105/66	108/68	108/68
	17,5	93/60	79/51	79/51
	19,4	84/57	62/42	62/42
Cross-wind Direction Grids	9,4	0/0	0/0	0/0
	10,6	.1/.3	.1/.3	.1/.3
	11,8	638/383	638/383	638/383
	12,10	0/0	0/0	0/0
	13,12	0/0	0/0	0/0
Special Receptors	406	2917/1646	2917/1646	2917/1646
	408	1304/756	1304/756	1304/756
	411	9250/5297	9250/5297	9250/5297
ENVIRON				
Wind Direction Grids	7,6	373/5.6	384/5.8	384/5.8
	9,5	344/6.6	354/6.8	354/6.8
	11,4	1492/79	1473/79	1473/79
	13,3	837/37	803/37	803/37
	15,2	669/27	601/25	601/25
	17,1	533/22	430/19	430/19
Cross-wind Direction Grids	9,0	530/15	547/16	547/16
	10,2	991/57	1002/58	1002/59
	11,4	1492/79	1473/79	1473/79
	12,6	178/5.2	164/5.0	164/5.0
	13,8	261/9.4	256/9.3	256/9.3
	14,10	309/7.4	339/8.2	339/8.2
AIR-BASE				
Wind Direction Grids	9,11	0/0	0/0	0/0
	11,10	2.2/0	2.2/0	2.2/0
	13,9	5.7/6.7	5.7/6.7	5.7/6.7
	15,8	7.6/7.2	29/27	29/27
	17,7	5.6/4.9	14/12	14/12
	19,6	3.8/3.2	7.1/6.3	7.1/6.3
Cross-wind Direction Grids	11,5	0/0	0/0	0/0
	12,7	0/0	0/0	0/0
	13,9	5.7/6.7	5.7/6.7	5.7/6.7
	14,11	0/0	0/0	0/0
	15,13	0/0	0/0	0/0

TABLE VIII

Effect of Stability Class on Concentrations of

CO/PT $\mu g/m^3$

(A) LID HEIGHT = 200 m

Run #		25	6	28
Stability Class		1	4	5
AIRCRAFT				
Wind Direction Grids	7,10	0/0	0/0	0/0
	9,9	0/0	0/0	0/0
	11,8	216/120	498/297	638/383
	13,7	104/64	124/81	168/111
	15,6	89/55	104/65	105/66
	17,5	71/49	94/62	93/60
	19,4	58/40	84/57	84/57
Cross-wind Direction Grids	9,4	0/0	0/0	0/0
	10,6	8/7	.3/.5	.1/.3
	11,8	216/120	498/297	638/383
	12,10	0/0	0/0	0/0
	13,12	0/0	0/0	0/0
Special Receptors	406	410/236	-	2917/1646
	408	592/292	-	1304/756
	411	3568/2067	-	9250/5297
ENVIRON				
Wind Direction Grids	7,6	204/3.0	283/4.2	373/5.6
	9,5	209/3.7	297/5.6	344/6.6
	11,4	629/30	1229/65	1492/79
	13,3	475/20	654/27	837/37
	15,2	444/19	583/23	669/27
	17,1	394/17	505/22	533/22
Cross-wind Direction Grids	9,0	265/7.1	412/12	530/15
	10,2	479/26	798/48	991/57
	11,4	629/30	1229/65	1492/79
	12,6	174/4.7	171/4.8	178/5.2
	13,8	215/6.9	239/8.6	261/9.4
	14,10	277/7.6	287/7.1	309/7.4
AIR-BASE				
Wind Direction Grids	9,11	0/0	0/0	0/0
	11,10	1.2/0	1.9/0	2.2/0
	13,9	7.9/7.0	10/10	5.7/6.7
	15,8	3.9/3.3	7.5/6.8	7.6/7.2
	17,7	2.6/2.1	5.2/4.5	5.6/4.9
	19,6	2.0/1.6	3.7/3.1	3.8/3.2
Cross-wind Direction Grids	11,5	0/0	0/0	0/0
	12,7	0/0	0/0	0/0
	13,9	7.9/7.0	10/10	5.7/6.7
	14,11	0/0	0/0	0/0
	15,13	0/0	0/0	0/0

TABLE VIII, CONT'D

(B) LID HEIGHT = 800 m

Run #		2/20	22	9	30
Stability Class		1	3	4	5
AIRCRAFT					
Wind Direction Grids	7,10	0/0	0/0	0/0	0/0
	9,9	0/0	0/0	0/0	0/0
	11,8	154/81	397/234	498/297	638/383
	13,7	26/17	80/51	119/78	176/116
	15,6	23/16	42/26	67/42	108/68
	17,5	18/14	27/21	47/33	79/51
	19,4	15/12	20/16	35/26	62/42
Cross-wind Direction Grids	9,4	0/0	0/0	0/0	0/0
	10,6	2.3/3.0	1.8/1.9	.3/.7	.1/.3
	11,8	154/81	397/234	498/297	638/383
	12,10	0/0	0/0	0/0	0/0
	13,12	0/0	0/0	0/0	0/0
Special Receptors	406	309/183	1637/929	-	2917/1646
	408	574/280	989/544	-	1304/756
	411	3496/2031	6816/3920	-	9250/5297
ENVIRON					
Wind Direction Grids	7,6	82/1.2	205/3.1	276/4.1	384/5.8
	9,5	68/1.4	169/3.5	242/4.8	354/6.8
	11,4	403/23	947/54	1146/63	1473/79
	13,3	147/5.4	373/17	543/25	803/37
	15,2	128/5.0	244/9.8	380/16	601/25
	17,1	99/4.3	146/6.3	249/11	430/19
Cross-wind Direction Grids	9,0	131/3.8	318/9.3	403/12	547/16
	10,2	263/21	596/41	750/47	1002/58
	11,4	403/23	947/54	1146/63	1473/79
	12,6	50/1.5	74/2.6	106/3.5	164/5.0
	13,8	54/1.7	93/3.3	157/5.7	256/9.3
	14,10	88/2.2	166/3.9	231/5.5	339/8.2
AIR-BASE					
Wind Direction Grids	9,11	0/0	0/0	0/0	0/0
	11,10	1.2/0	1.8/0	1.9/0	2.2/0
	13,9	3.2/2.9	14/14	10/10	5.7/6.7
	15,8	1.4/1.2	6.9/6.2	18/16	29/27
	17,7	.9/.7	1.9/1.7	7.8/7.1	14/12
	19,6	.6/.5	1.2/1.1	4.2/3.7	7.1/6.3
Cross-wind Direction Grids	11,5	0/0	0/0	0/0	0/0
	12,7	0/0	0/0	0/0	0/0
	13,9	3.2/2.9	14/14	10/10	5.7/6.7
	14,11	0/0	0/0	0/0	0/0
	15,13	0/0	0/0	0/0	0/0

TABLE IX

Effect of Wind Speed on Concentrations of

CO/PT, $\mu g/m^3$

Run #		2/20	3
Wind Speed, m/s		2.57	9.27
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	154/81	35/19
	13,7	26/17	7.4/4.6
	15,6	23/16	6.5/4.5
	17,5	18/14	5.3/3.9
	19,4	15/12	4.3/3.4
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	2.3/3.0	.5/.8
	11,8	154/81	35/19
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	309/183	-
	408	574/280	-
	411	3496/2031	-
ENVIRON			
Wind Direction Grids	7,6	82/1.2	23/.3
	9,5	68/1.4	19/.4
	11,4	403/23	118/6.7
	13,3	147/5.4	42/1.5
	15,2	128/5.0	36/1.4
	17,1	99/4.3	28/1.2
Cross-wind Direction Grids	9,0	131/3.8	38/1.1
	10,2	263/21	73/6.0
	11,4	403/23	118/6.7
	12,6	50/1.5	14/.4
	13,8	54/1.7	15/.5
	14,10	88/2.2	25/.6
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	.3/0
	13,9	3.2/2.9	2.2/2.0
	15,8	1.4/1.2	.6/.5
	17,7	.9/.7	.4/.3
	19,6	.6/.5	.3/.2
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	3.2/2.9	2.2/2.0
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE X

Effect of Wind Direction on Concentrations of

CO/PT, $\mu g/m^3$

Run #		27	18/24	2/20
Wind Direction, °		272	287	292
AIRCRAFT				
Wind Direction Grids	7,10	0/0	0/0	0/0
	9,9	0/0	0/0	0/0
	11,8	129/70	151/80	154/81
	13,7	12/8.5	23/15	26/17
	15,6	7.3/8.0	19/14	23/16
	17,5	5.1/6.1	15/12	18/14
	19,4	3.8/4.2	12/10	15/12
Cross-wind Direction Grids	9,4	0/0	0/.1	0/0
	10,6	.5/1.8	1.2/2.4	2.3/3.0
	11,8	129/70	151/80	154/81
	12,10	.3/.2	0/0	0/0
	13,12	0/0	0/0	0/0
Special Receptors	406	227/143	298/177	309/183
	408	559/270	572/277	574/280
	411	2918/1696	3413/1982	3496/2031
ENVIRON				
Wind Direction Grids	7,6	82/1.4	86/1.5	82/1.2
	9,5	74/1.6	70/1.4	68/1.4
	11,4	403/23	402/23	403/23
	13,3	145/6.1	149/5.7	147/5.4
	15,2	108/4.8	126/5.2	128/5.0
	17,1	66/3.3	95/4.3	99/4.3
Cross-wind Direction Grids	9,0	81/2.3	116/3.3	131/3.8
	10,2	222/21	240/21	263/21
	11,4	403/23	402/23	403/23
	12,6	53/1.4	51/1.5	50/1.5
	13,8	48/1.2	53/1.6	54/1.7
	14,10	95/2.4	90/2.3	88/2.2
AIR-BASE				
Wind Direction Grids	9,11	0/0	0/0	0/0
	11,10	1.3/0	1.2/0	1.2/0
	13,9	3.9/3.7	3.9/3.6	3.2/2.9
	15,8	.7/.6	1.3/1.2	1.4/1.2
	17,7	.3/.2	.8/.7	.9/.7
	19,6	.2/.1	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0	0/0
	12,7	0/0	0/0	0/0
	13,9	3.9/3.7	3.9/3.6	3.2/2.9
	14,11	.1/0	0/0	0/0
	15,13	0/0	0/0	0/0

TABLE XI

Effect of Ambient Temperature on Concentrations of CO/PT, $\mu g/m^3$

Run #		2/20	10
Temperatue, °F		60	70
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	154/81	158/83
	13,7	26/17	26/17
	15,6	23/16	23/16
	17,5	18/14	18/14
	19,4	15/12	15/12
Cross-wind Direction Grids	9,4	0/0	0/.1
	10,6	2.3/3.0	2.3/3.0
	11,8	154/81	158/83
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	309/183	-
	408	574/280	-
	411	3496/2031	-
ENVIRONS			
Wind Direction Grids	7,6	82/1.2	82/1.2
	9,5	68/1.4	68/1.4
	11,4	403/23	403/23
	13,3	147/5.4	147/5.4
	15,2	128/5.0	128/5.0
	17,1	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	131/3.8
	10,2	263/21	263/21
	11,4	403/23	403/23
	12,6	50/1.5	50/1.5
	13,8	54/1.7	54/1.7
	14,10	88/2.2	88/2.2
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	1.2/0
	13,9	3.2/2.9	3.2/2.9
	15,8	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	3.2/2.9	3.2/2.9
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XII

Effect of Initial Line Source Width for Aircraft Taxi and Runways on Concentrations of CO/PT, $\mu g/m^3$

Run #		11	2/20	12
Initial Width, m		15	20	30
AIRCRAFT				
Wind Direction Grids	7,10	0/0	0/0	0/0
	9,9	0/0	0/0	0/0
	11,8	155/81	154/81	154/81
	13,7	26/17	26/17	26/17
	15,6	23/16	23/16	23/16
	17,5	18/14	18/14	18/14
	19,4	15/12	15/12	15/12
Cross-wind Direction Grids	9,4	0/.1	0/0	0/.1
	10,6	2.2/3.0	2.3/3.0	2.3/3.0
	11,8	155/81	154/81	154/81
	12,10	0/0	0/0	0/0
	13,12	0/0	0/0	0/0
Special Receptors	406	-	309/183	-
	408	-	574/280	-
	411	-	3496/2031	-
ENVIRONS				
Wind Direction Grids	7,6	82/1.2	82/1.2	82/1.2
	9,5	68/1.4	68/1.4	68/1.4
	11,4	403/23	403/23	403/23
	13,3	147/5.4	147/5.4	147/5.4
	15,2	128/5.0	128/5.0	128/5.0
	17,1	99/4.3	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	131/3.8	131/3.8
	10,2	263/21	263/21	263/21
	11,4	403/23	403/23	403/23
	12,6	50/1.5	50/1.5	50/1.5
	13,8	54/1.7	54/1.7	54/1.7
	14,10	88/2.2	88/2.2	88/2.2
AIR-BASE				
Wind Direction Grids	9,11	0/0	0/0	0/0
	11,10	1.2/0	1.2/0	1.2/0
	13,9	3.2/2.9	3.2/2.9	3.2/2.9
	15,8	1.4/1.2	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0	0/0
	12,7	0/0	0/0	0/0
	13,9	3.2/2.9	3.2/2.9	3.2/2.9
	14,11	0/0	0/0	0/0
	15,13	0/0	0/0	0/0

TABLE XIII

Effect of Average Emission Height of Aircraft Taxi and Runways on Concentrations of CO/PT, $\mu g/m^3$

	Run #	2/20	13	17/21
	Emission Height, m	4	8	16
AIRCRAFT				
Wind Direction Grids	7,10	0/0	0/0	0/0
	9,9	0/0	0/0	0/0
	11,8	154/81	149/78	137/71
	13,7	26/17	26/17	26/17
	15,6	23/16	23/16	23/16
	17,5	18/14	18/14	18/14
	19,4	15/12	15/12	15/12
Cross-wind Direction Grids	9,4	0/0	0/.1	0/.1
	10,6	2.3/3.0	2.3/3.0	2.3/3.0
	11,8	154/81	149/78	137/71
	12,10	0/0	0/0	0/0
	13,12	0/0	0/0	0/0
Special Receptors	406	309/183	-	308/181
	408	574/280	-	203/119
	411	3496/2031	-	3451/2002
ENVIRONS				
Wind Direction Grids	7,6	82/1.2	88/1.2	82/1.2
	9,5	68/1.4	68/1.4	68/1.4
	11,4	403/23	403/23	403/23
	13,3	147/5.4	147/5.4	147/5.4
	15,2	128/5.0	128/5.0	128/5.0
	17,1	99/4.3	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	131/3.8	131/3.8
	10,2	263/21	263/21	263/21
	11,4	403/23	403/23	403/23
	12,6	50/1.5	50/1.5	50/1.5
	13,8	54/1.7	54/1.7	54/1.7
	14,10	88/2.2	88/2.2	88/2.2
AIR-BASE				
Wind Direction Grids	9,11	0/0	0/0	0/0
	11,10	1.2/0	1.2/0	1.2/0
	13,9	3.2/2.9	3.2/2.9	3.2/2.9
	15,8	1.4/1.2	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0	0/0
	12,7	0/0	0/0	0/0
	13,9	3.2/2.9	3.2/2.9	3.2/2.9
	14,11	0/0	0/0	0/0
	15,13	0/0	0/0	0/0

TABLE XIV

Effect of Initial Vertical Dispersion Parameter for all Point Sources on Concentrations of CO/PT, μg/m^3

(A) LID HEIGHT = 800 m

STABILITY CLASS = 1

Run #		2/20	31
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	154/81	154/81
	13,7	26/17	26/17
	15,6	23/16	23/16
	17,5	18/14	18/14
	19,4	15/12	15/12
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	2.3/3.0	2.3/3.0
	11,8	154/81	154/81
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	309/183	309/183
	408	574/280	574/280
	411	3496/2031	3496/2031
ENVIRONS			
Wind Direction Grids	7,6	82/1.2	82/1.2
	9,5	68/1.4	68/1.4
	11,4	403/23	403/23
	13,3	147/5.4	147/5.4
	15,2	128/5.0	128/5.0
	17,1	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	131/3.8
	10,2	263/21	263/21
	11,4	403/23	403/23
	12,6	50/1.5	50/1.5
	13,8	54/1.7	54/1.7
	14,10	88/2.2	88/2.2
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	1.2/0
	13,9	3.2/2.9	3.1/2.9
	15,8	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	3.2/2.9	3.1/2.9
	14,11	0/0	0/0
	15,13	0/0	000/0

TABLE XIV, CONT'D

(B) LID HEIGHT = 800 m

STABILITY CLASS = 5

Run #		30	32
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	638/383	638/383
	13,7	176/116	176/116
	15,6	108/68	108/68
	17,5	79/51	79/51
	19,4	62/42	62/42
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	.1/.3	.1/.3
	11,8	638/383	638/383
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	2917/1646	2917/1646
	408	1304/756	1304/756
	411	9250/5297	9250/5297
ENVIRON			
Wind Direction Grids	7,6	384/5.8	384/5.8
	9,5	354/6.8	354/6.8
	11,4	1473/79	1473/79
	13,3	803/73	803/73
	15,2	601/25	601/25
	17,1	430/19	430/19
Cross-wind Direction Grids	9,0	547/16	547/16
	10,2	1002/58	1002/58
	11,4	1473/79	1473/79
	12,6	164/5.0	164/5.0
	13,8	256/9.3	256/9.3
	14,10	339/8.2	339/8.2
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	2.2/0	2.2/0
	13,9	5.7/6.7	5.6/6.6
	15,8	29/27	29/26
	17,7	14/12	14/12
	19,6	7.1/6.3	7.1/6.3
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	5.7/6.7	5.6/6.6
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XIV, CONT'D

(C) LID HEIGHT = 200 m
STABILITY CLASS = 1

Run #		25	33
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	216/120	216/120
	13,7	104/64	104/64
	15,6	89/55	89/55
	17,5	71/49	71/49
	19,4	58/40	58/40
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	8/7	8/7
	11,8	216/120	216/120
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	410/236	410/236
	408	592/292	592/292
	411	3568/2067	3568/2067
ENVIRON			
Wind Direction Grids	7,6	204/3.0	204/3.0
	9,5	209/3.7	209/3.7
	11,4	629/30	629/30
	13,3	475/20	475/20
	15,2	444/19	444/19
	17,1	394/17	394/17
Cross-wind Direction Grids	9,0	265/7.1	265/7.1
	10,2	479/26	479/26
	11,4	629/30	629/30
	12,6	174/4.7	174/4.7
	13,8	215/6.9	215/6.9
	14,10	277/7.6	277/7.6
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	1.2/0
	13,9	7.9/7.0	7.9/7.0
	15,8	3.9/3.3	3.9/3.3
	17,7	2.6/2.1	2.6/2.1
	19,6	2.0/1.6	2.0/1.6
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	7.9/7.0	7.9/7.0
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XV

Effect of Initial Vertical Dispersion Parameter for all Area Sources on Concentrations of CO/PT, $\mu g/m^3$

(A) LID HEIGHT = 800 m

STABILITY CLASS = 1

Run #		2/20	34
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	154/81	152/80
	13,7	26/17	26/17
	15,6	23/16	23/16
	17,5	18/14	18/14
	19,4	15/12	15/12
Cross-wind Direction Grids	9,4	0/0	0/.1
	10,6	2.3/3.0	2.3/3.0
	11,8	154/81	152/80
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	309/183	295/175
	408	574/280	569/277
	411	3496/2031	2965/1721
ENVIRON			
Wind Direction Grids	7,6	82/1.2	77/1.1
	9,5	68/1.4	65/1.3
	11,4	403/23	354/20
	13,3	147/5.4	141/5.3
	15,2	128/5.0	124/5.0
	17,1	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	118/3.4
	10,2	263/21	234/18
	11,4	403/23	354/20
	12,6	50/1.5	48/1.5
	13,8	54/1.7	54/1.7
	14,10	88/2.2	84/2.1
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	.9/0
	13,9	3.2/2.9	3.2/2.9
	15,8	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	3.2/2.9	3.2/2.9
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XV, CONT'D

(B) LID HEIGHT = 800 m

STABILITY CLASS = 5

Run #		30	35
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	638/383	628/377
	13,7	176/116	176/116
	15,6	108/68	108/68
	17,5	79/51	79/51
	19,4	62/42	62/42
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	.1/.3	.1/.3
	11,8	638/383	628/377
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	2917/1646	2798/1576
	408	1304/756	1282/740
	411	9250/5297	8066/4608
ENVIRON			
Wind Direction Grids	7,6	384/5.8	370/5.6
	9,5	354/6.8	345/6.5
	11,4	1473/79	1362/72
	13,3	803/73	787/36
	15,2	601/25	591/25
	17,1	430/19	429/19
Cross-wind Direction Grids	9,0	547/16	514/15
	10,2	1002/58	941/52
	11,4	1473/79	1362/72
	12,6	164/5.0	160/4.8
	13,8	256/9.3	256/9.3
	14,10	339/8.2	330/8.1
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	2.2/0	1.8/0
	13,9	5.7/6.7	5.6/6.7
	15,8	29/27	19/27
	17,7	14/12	14/12
	19,6	7.1/6.3	7.1/6.3
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	5.7/6.7	5.6/6.7
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XV, CONT'D

(C) LID HEIGHT = 200 m

STABILITY CLASS = 1

Run #		25	36
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	216/120	215/120
	13,7	104/64	104/64
	15,6	89/55	89/55
	17,5	71/49	71/49
	19,4	58/40	58/40
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	8/7	8.0/7.2
	11,8	216/120	215/120
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	410/236	399/229
	408	592/292	589/290
	411	3568/2067	3037/1758
ENVIRON			
Wind Direction Grids	7,6	204/3.0	198/3.0
	9,5	209/3.7	206/3.6
	11,4	629/30	577/27
	13,3	475/20	469/20
	15,2	444/19	440/19
	17,1	394/17	394/17
Cross-wind Direction Grids	9,0	265/7.1	251/6.7
	10,2	479/26	451/23
	11,4	629/30	577/27
	12,6	174/4.7	172/4.6
	13,8	215/6.9	215/6.9
	14,10	277/7.6	273/7.5
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	.9/0
	13,9	7.9/7.0	7.9/7.0
	15,8	3.9/3.3	3.9/3.3
	17,7	2.6/2.1	2.6/2.1
	19,6	2.0/1.6	2.0/1.6
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	7.9/7.0	7.9/7.0
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XVI

Effect of Initial Vertical Dispersion Parameter for all Line Sources on Concentrations of CO/PT, $\mu g/m^3$

(A) LID HEIGHT = 800 m

STABILITY CLASS = 1

Run #		2/20	37
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	154/81	149/79
	13,7	26/17	26/17
	15,6	23/16	23/16
	17,5	18/14	18.14
	19,4	15/12	15/12
Cross-wind Direction Grids	9,4	0/0	0/0.1
	10,6	2.3/3.0	2.2/3.0
	11,8	154/81	149/79
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	309/183	307/182
	408	574/280	503/248
	411	3496/2031	3458/2009
ENVIRON			
Wind Direction Grids	7,6	82/1.2	82/1.2
	9,5	68/1.4	68/1.4
	11,4	403/23	403/23
	13,3	147/5.4	147/5.4
	15,2	128/5.0	128/5.0
	17,1	99/4.3	99/4.3
Cross-wind Direction Grids	9,0	131/3.8	131/3.8
	10,2	263/21	263/21
	11,4	403/23	403/23
	12,6	50/1.5	50/1.5
	13,8	54/1.7	54/1.7
	14,10	88/2.2	88/2.2
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	1.2/0
	13,9	3.2/2.9	3.2/2.9
	15,8	1.4/1.2	1.4/1.2
	17,7	.9/.7	.9/.7
	19,6	.6/.5	.6/.5
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	3.2/2.9	3.2/2.9
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XVI, CONT'D

(C) LID HEIGHT = 200 m
STABILITY CLASS = 1

Run #		25	39
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	216/120	212/118
	13,7	104/64	104/64
	15,6	89/55	89/56
	17,5	71/49	71/49
	19,4	58/40	58/40
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	8/7	8.0/7.2
	11,8	216/120	212/118
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	410/236	409/236
	408	592/292	522/261
	411	3568/2067	3534/2048
ENVIRON			
Wind Direction Grids	7,6	204/3.0	204/3.0
	9,5	209/3.7	209/3.7
	11,4	629/30	629/30
	13,3	475/20	475/20
	15,2	444/19	444/19
	17,1	394/17	394/17
Cross-wind Direction Grids	9,0	265/7.1	265/7.1
	10,2	479/26	479/26
	11,4	629/30	629/30
	12,6	174/4.7	174/4.7
	13,8	215/6.9	215/6.9
	14,10	277/7.6	277/7.6
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	1.2/0	1.2/0
	13,9	7.9/7.0	7.9/7.0
	15,8	3.9/3.3	3.9/3.3
	17,7	2.6/2.1	2.6/2.1
	19,6	2.0/1.6	2.0/1.6
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	7.9/7.0	7.9/7.0
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XVI, CONT'D

(B) LID HEIGHT = 800 m

STABILITY CLASS = 5

Run #		30	38
Vertical Dispersion Parameters		Original Model	x 1.5
AIRCRAFT			
Wind Direction Grids	7,10	0/0	0/0
	9,9	0/0	0/0
	11,8	638/383	624/376
	13,7	176/116	176/116
	15,6	108/68	108/68
	17,5	79/51	79/51
	19,4	62/42	62/42
Cross-wind Direction Grids	9,4	0/0	0/0
	10,6	.1/.3	.1/.3
	11,8	638/383	624/376
	12,10	0/0	0/0
	13,12	0/0	0/0
Special Receptors	406	2917/1646	2897/1635
	408	1304/756	1227/720
	411	9250/5297	9156/5247
ENVIRON			
Wind Direction Grids	7,6	384/5.8	383/5.8
	9,5	354/6.8	354/6.8
	11,4	1473/79	1473/79
	13,3	803/73	803/73
	15,2	601/25	601/25
	17,1	430/19	430/19
Cross-wind Direction Grids	9,0	547/16	547/16
	10,2	1002/58	1002/58
	11,4	1473/79	1473/79
	12,6	164/5.0	164/5.0
	13,8	256/9.3	256/9.3
	14,10	339/8.2	339/8.2
AIR-BASE			
Wind Direction Grids	9,11	0/0	0/0
	11,10	2.2/0	2.2/0
	13,9	5.7/6.7	5.7/6.7
	15,8	29/27	29/27
	17,7	14/12	14/12
	19,6	7.1/6.3	7.1/6.3
Cross-wind Direction Grids	11,5	0/0	0/0
	12,7	0/0	0/0
	13,9	5.7/6.7	5.7/6.7
	14,11	0/0	0/0
	15,13	0/0	0/0

TABLE XVII

Effects of Meteorological and Model Parameters on Concentrations ($\mu g/m^3$) at Special Receptors

Nominal Conditions: Stability class = 1, h_{lid} = 800 m, wind direction = 292°, wind speed = 2.57 m/sec, ambient temperature = 60°F, A/C line source height = 4 m

Receptor #1 (x = 8.37 km , y = 8.52 km) - Background

Aircraft: $\mu \approx o$, all conditions

Air-base: $\mu \approx o$, all conditions

Environ:

μ_{co}	μ_{pt}	Conditions
140	6	nominal
250	9	h_{lid} = 200 m
582	23	JSTAB = 5, all h_{lid}
113	4	WD = 272°
41	2	WS = 9.27 m/sec

Receptor #8 (x = 10.79 km, y = 8.17 km) 0.34 km downwind of hot refueling area

Aircraft:

μ_{co}	μ_{pt}	Conditions
574	280	nominal
592	292	other h_{lid}
1304	756	JSTAB = 5, all h_{lid}
559	270	WD = 272°
154	75	WS = 9.27 m/sec
203	119	$z_{A/C\ lines}$ = 16 m
503	248	1.5 x σ_{zo}, all line sources

Air-base: negligible

Environ:	60	2	nominal
	201	7	h_{lid} = 200 m
	40	1	h_{lid} = 1400 m
	321	10	JSTAB = 5, all h_{lid}
	52	1	WD = 272°
	17	1	WS = 9.27 m/sec

Receptor #11 (x = 12.28 km, y = 8.31 km) 0.08 km downwind of take-off end of runway #1

	μ_{co}	μ_{pt}	Conditions
Aircraft:	3496	2031	nominal
	no significant change		$h_{lid} \leq 400$ m
	9250	5297	JSTAB = 5, all h_{lid}
	2918	1696	WD = 272°
	904	525	WS = 9.27 m/sec
	3451	2002	$Z_{A/C\ lines}$ = 16 m
	2965	1721	1.5 x σ_{zo} , all area sources
Air-base:	negligible		
Environ:	54	2	nominal
	216	7	h_{lid} = 200 m
	31	1	h_{lid} = 1400 m
	296	11	JSTAB = 5, all h_{lid}
	57	2	WD = 272°
	15	1	WS = 9.27 m/sec

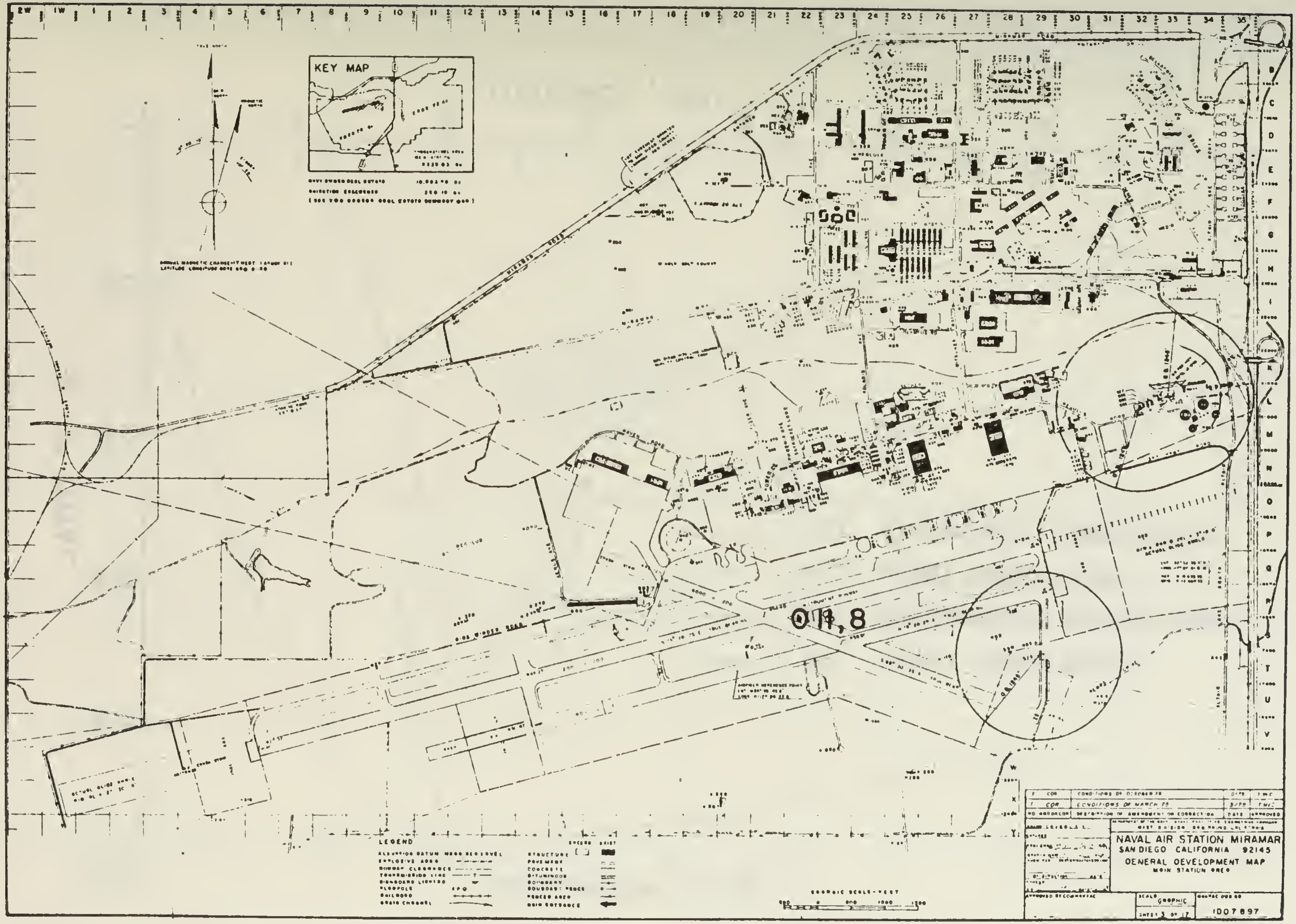

FIG. 1. GRID IDENTIFICATION (1 km spacing) AT NAS MIRAMAR

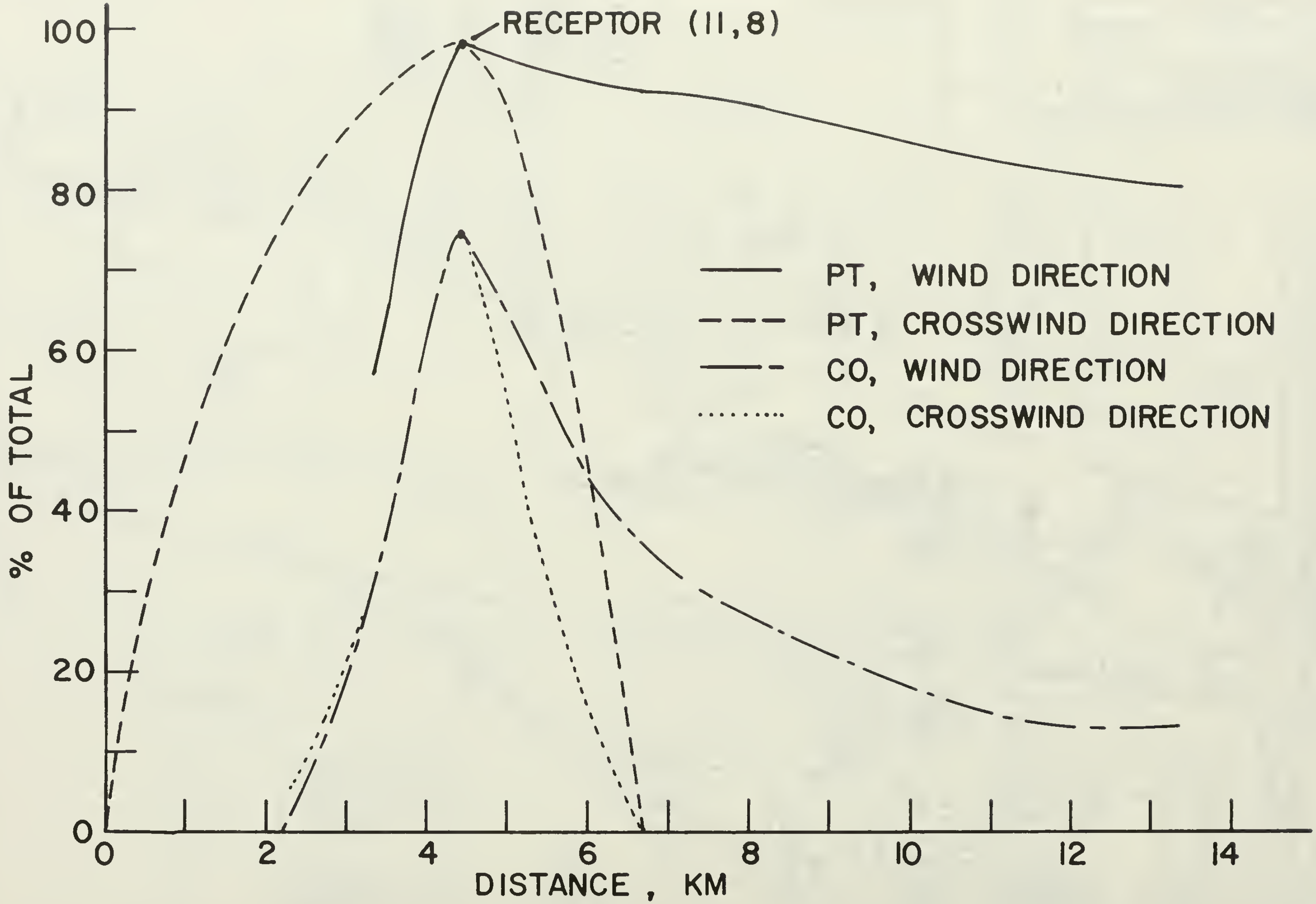

FIG. 2. EFFECT OF DISTANCE ON AIRCRAFT CONTRIBUTION TO RECEPTOR CONCENTRATIONS OF CO and PT (RUN # 2/20)

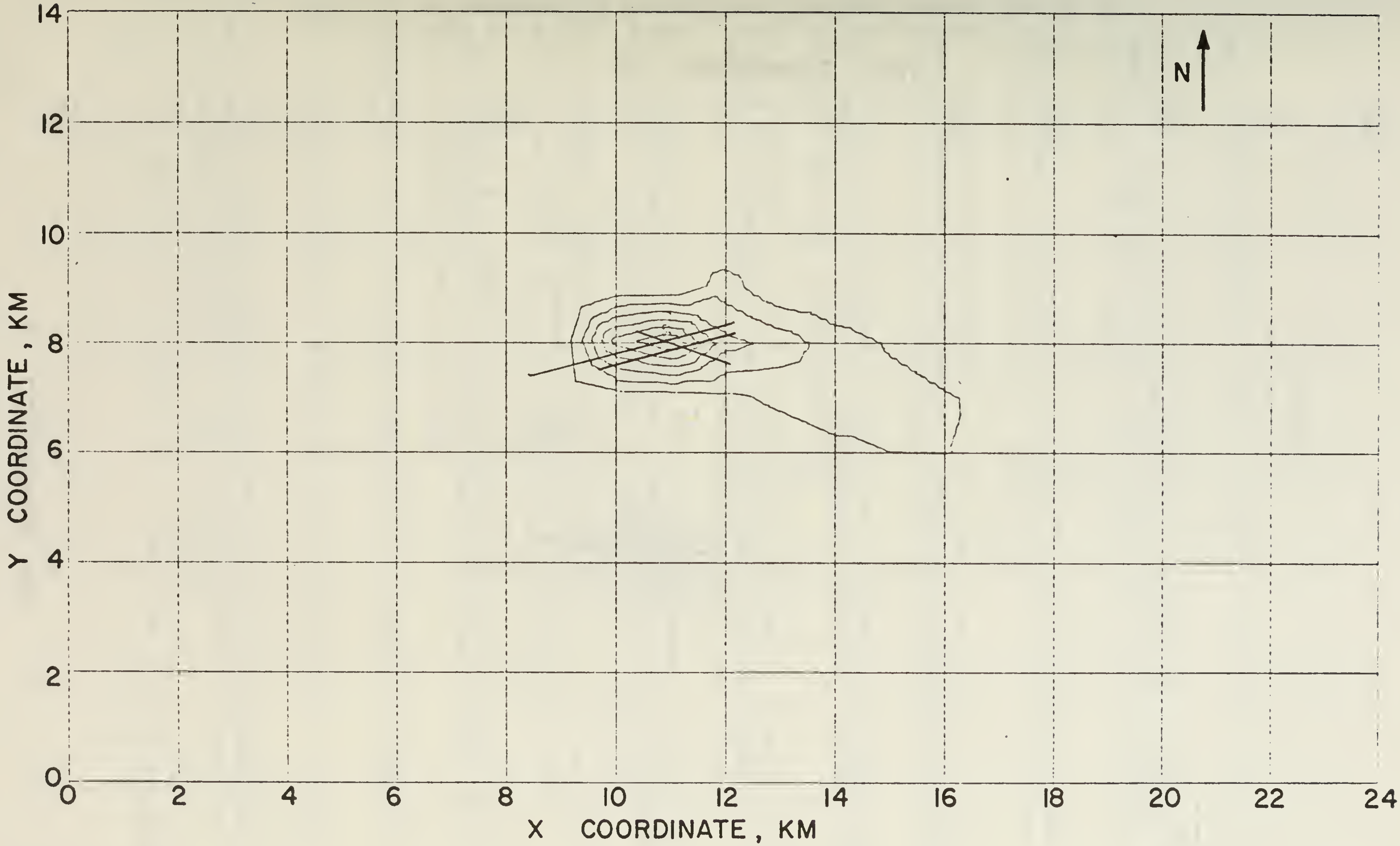

FIG. 3. CO CONCENTRATION PROFILES FROM AIRCRAFT SOURCES, RUN NO. 10

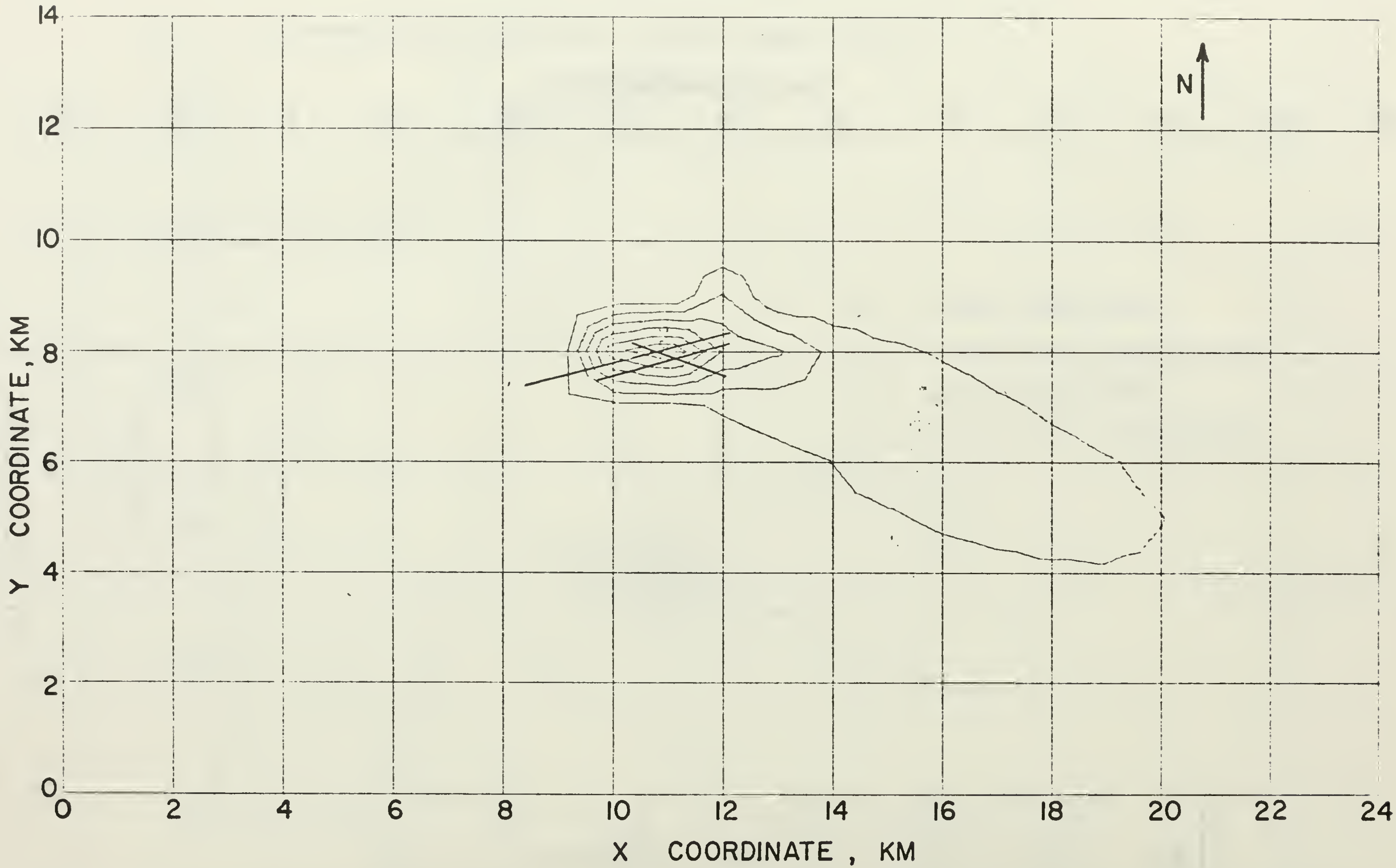

FIG. 4. PT CONCENTRATION PROFILES FROM AIRCRAFT SOURCES, RUN NO. 10

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